REMARKS

In the Office Action dated 5/18/2005, the Examiner rejected claims 1-24 as being unpatentable under 35 USC §103(a). By this communication, claim 8 has been cancelled without prejudice, claim 18 has been amended to more clearly define the invention, and new claims 25-28 has been added. Claims 1-7 and 9-28 are now pending. Applicant respectfully requests reconsideration of the application in view of the foregoing amendments and the remarks set forth below.

Applicant's representative gratefully acknowledges the assistance provided by the Examiner during the telephone interview of August 10, 2005. Based on the discussion with the Examiner, it is Applicant's understanding that the rejections and arguments set forth in the first paragraph of page 3 of the aforementioned Office Action are directed to subsets of dependent claims 2-14 that sequentially correspond to the sentences of the paragraph, and Applicant is addressing these rejections accordingly.

Rejections Under 35 USC §103(a)

1. Rejections Based on Schoen et al.

Claims 1-14 and 17-22 were rejected under 35 USC §103(a) as being unpatentable over Schoen et al. (US Patent No. 5,089,703). Applicant submits that each of the rejected claims recites at least one element that is not disclosed or suggested by Schoen et al., and that the §103(a) rejection should consequently be withdrawn.

Claim 1 recites a method of trapping or guiding ions, including a step of "applying periodic voltages to electrodes in the second set of electrodes to generate a second oscillating electric potential that axially confines the ions in the ion channel." This step is discussed in the specification at (among other places) page 10, line 20 to page 15, line 12. Briefly described, the periodic voltages applied to the second set of electrodes produce a pseudopotential that increases in the direction of at least one end of the ion channel, thereby creating a barrier to the axial movement of ions. The use of an oscillating potential to effect axial confinement of ions in a

multipole, as embodied by claim 1, stands in contradistinction to prior art axial confinement techniques, which create barriers by the application of different DC biases to axially spaced – apart electrodes. The claimed technique offers several advantages over the prior art techniques, including the ability to simultaneously confine ions of opposite polarities.

In setting forth the rejection of claim 1, the Examiner has stated that Schoen et al. teaches a step of applying periodic voltages to electrodes in the second set of electrodes that axially confine the ions in the ion channel, pointing to column 17, lines 32-42 and Figure 8 to support this assertion. Applicant respectfully disagrees. A review of the Schoen et al. patent, including the cited sections thereof, does not reveal any teachings regarding the application of periodic voltages to create an oscillating potential that **axially** confines ions to the ion channel. In fact, the Schoen et al. patent is entirely silent on the topic of axial confinement (the confinement of ions in the dimension parallel to the major longitudinal axis of the multipole) because there is no need for axial confinement in the Schoen et al. device, which performs mass-to-charge filtering of a beam of ions as they "fly through" the device along the major longitudinal axis thereof. Instead, the teachings of Schoen et al. are directed to the generation of an auxiliary field (e.g., by application of a modulated auxiliary voltage to the electrodes) that destabilizes ions in the **radial** dimension, i.e., in the dimensions orthogonal or transverse to the major longitudinal axis. Nothing in Schoen et al. teaches or suggests the claimed limitation of producing axial confinement in an ion guide or trap by generating an oscillating potential via application of periodic voltages to a set of electrodes.

In light of the above, applicant submits that claim 1 is patentable over Schoen et al., and withdrawal of the rejection of claim 1 under 35 U.S.C. §103(a) is therefore respectfully requested.

Claim 2 depends from claim 1 and inherits all of the limitations thereof, and is submitted to be patentable over Schoen et al. for at least the reasons advanced above in connection with Claim 1. Furthermore, claim 2 recites the introduction of positive and negative ions into the ion trap, which is nowhere taught or suggested by Schoen et al. In fact, as noted above, prior art axial confinement techniques did not have the ability to simultaneously confine ions of opposite polarities, so there would be no motivation to introduce positive and negative ions into the

multipole structure of Schoen et al. in view of the fact that only ions of one polarity could be axially contained. Still further, Schoen et al. is directed to a device that performs mass-to-charge filtering of an ion beam traveling from an entrance to an exit end of a multipole structure, i.e., the ions to be analyzed need to be introduced into the multipole via one end of the multipole. Adapting the Schoen et al. device for introduction of positive and negative ions would require specially designed ion optics for focusing a mixed positive/negative ion beam into the entrance end of the multipole; such ion optics are not taught or suggested by the prior art of record.

Claims 3 and 4 depend from claim 2, which in turn depends from Claim 1, and inherit all the limitations thereof, and are submitted to be patentable over Schoen et al. for at least the reasons advanced above in connection with claims 1 and 2. Furthermore, claim 4 recites the application of DC biases to one or more sections of the ion trap or ion guide **to confine ions in the ion guide**. While Schoen et al. does allude to the application of DC voltages in a multipole structure (see col. 1, lines 25-35), it does so in the context of creating a combined RF/DC field for mass-to-charge filtering of ions; any teaching of the use of DC biases to confine ions in the trap or guide is absent.

Claims 5-7 and 9-11 depend directly or indirectly from claim 1 and inherit all of the limitations thereof, and are submitted to be patentable for at least the reasons advanced in connection with claim 1.

Claim 12 depends from Claim 1 and inherits all the limitations thereof, and is submitted to be patentable over Schoen et al. for at least the reasons advanced above in connection with claim 1. In addition, claim 12 recites that "the first and second oscillating electric potentials define a pseudopotential for each particular mass and charge of the introduced ions such that each of the defined pseudopotentials specifies a corresponding potential barrier." As discussed above, the generation of such barriers serve to axially confine the ions in the ion channel. No such teaching can be found in Schoen.

Independent claim 17 is submitted to be patentable over Schoen et al. for substantially the same reasons provided above in connection with claim 1. More specifically, claim 17 is directed to an apparatus that includes "a controller configured to apply periodic voltages to electrodes in

the first and second set to establish a first oscillating electric potential and a second oscillating electric potential, wherein the first and second oscillating electric potentials have different spatial distributions and confine ions in the ion channel in radial **and axial directions**, respectively" [emphasis added]. Again, Schoen et al. fails to disclose or suggest any method or apparatus for axially confining ions in an ion channel, and particularly fails to disclose the claimed limitation of axially confining ions via creation of an oscillating potential, In light of this, Applicant submits that claim 17 is patentable over Schoen, and withdrawal of the rejection of claim 17 under §103(a) is therefore respectfully requested.

Claims 18-22 depend from claim 17 and inherit all of the limitations thereof, and are submitted to be patentable over Schoen for at least the reasons advance above in connection with claim 17. Furthermore, these claims recite additional limitations that are not disclosed or suggested by Schoen et al. In particular, claim 18 recites that the controller is configured to confine simultaneously positive and negative ions, and claim 19 claims periodic voltages of different frequencies being applied to the first and second set of electrodes.

2. Rejections Based on Schoen et al. in View of Wells

Dependent claims 15, 16, 23 and 24 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Schoen et al. in view of Wells (U.S. Patent No. 6,730,904). These claims are submitted to be patentable over the Schoen et al. and Wells references for the same reasons advanced above in connection with the claims from which they depend. Notably, neither Schoen et al. nor Wells teaches or discloses a step of or apparatus for generating an oscillating potential to effect axial confinement of ions.

3. New claims

Newly added claims 25-28, which depend indirectly from claim 1, are submitted to be patentable over the prior art of record for the reasons advanced above in connection with claim 1 and intervening claim 5. In addition, claims 25-28 all require the introduction of positive and negative ions into the guide or trap from opposite ends

thereof. The introduction of ions of opposite polarities into the trap or guide is neither taught nor suggested by any of the prior art references cited by the Examiner.

In view of the above discussion, it is submitted that the Application is now in condition for allowance and such favorable action is respectfully requested. The Examiner is invited to contact the undersigned Applicant's representative by telephone if he believes that doing so will be helpful to resolve any outstanding issues and advance the prosecution of the Application.

The Commissioner is hereby authorized to charge any other fees determined to be due to Deposit Account 50-3267.

Respectfully submitted,

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